obtained by measurements of other properties of salt solutions, the electric conductivity, the depression of the freezing point, &c., and the theory is compared with practice by seeing if the values of "*i*," as determined, say, from freezing-point observations, agree with those deduced from the osmotic pressure. The comparison shows that in some cases, some half-a-dozen in all, the two sets of values correspond; in others, and in by far the majority, no such correspondences exist. In these latter instances it is argued, and with a certain amount of experimental evidence, that the salts were not without action on the membrane employed, and that, therefore, diosmose really took place, the membrane was not truly semi-permeable. In this way the discordant observations have been put out of court.

It is thus apparent that the leading hypotheses of the new theory do not receive confirmation of the weightiest kind from observations on osmotic pressure. Indeed, were they supported by such measurements alone, they would hardly be entertained. Their mainstay, however, ies in the mass of experimental work on many other properties—evidence which it is much easier to obtain than the difficult measurements on osmotic pressure—which has been correlated and explained by their use.

It is only fair to add that both hypotheses, from physical as well as chemical standpoints, have met with a measure of adverse criticism. The *rôle* played by the membrane has also been questioned. It has been suggested that it is not really semi-permeable, allowing solvent only to pass, but just as a porous plug behaves towards a mixture of gases, it allows molecules with different momenta to traverse it at different rates. Or, again, its action has been likened to that of a palladium film towards hydrogen, compounds being formed with the membrane substance on one side, these becoming diffused and dissociated on the other. If either of these views be correct the pressures exerted by dissolved substances have probably never been measured.

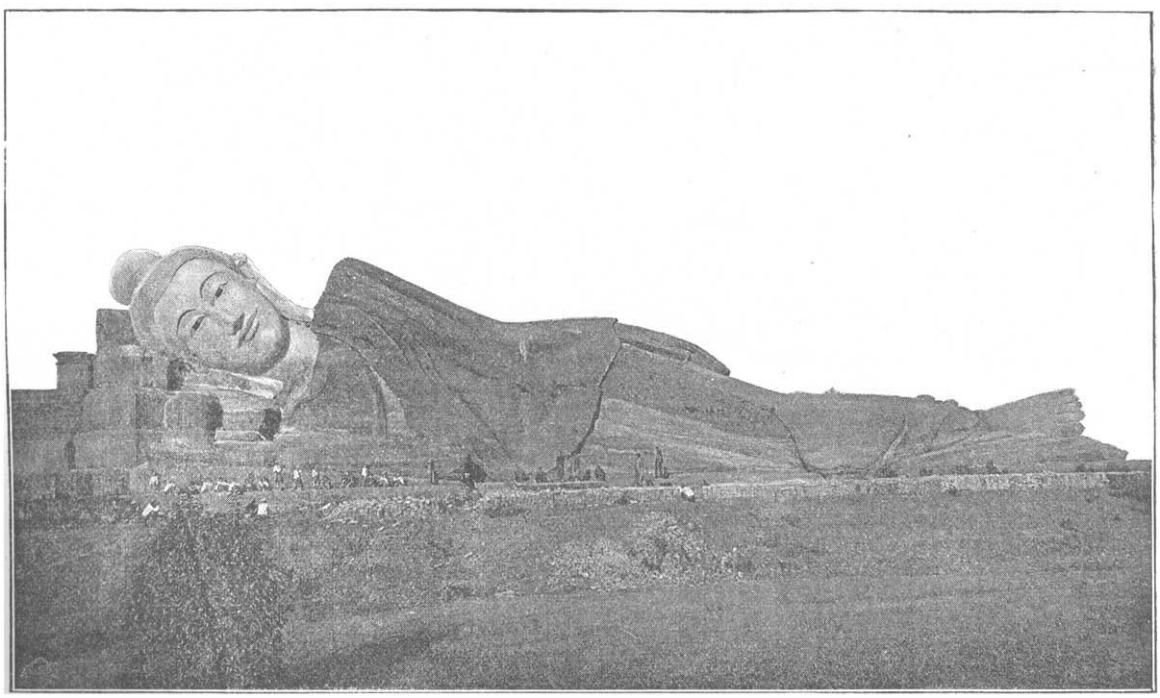
On the other hand, important theoretical support has been put forward in favour of the gaseous analogy. Several physicists, starting from entirely different points of view, have arrived at the result that in a dilute solution the dissolved substance should obey laws similar to those which hold for gases. At present the attitude of the prominent upholders of the new theory is one of indifference as to the exact mechanism of osmotic pressure. The numerical agreement between the measurements on solutions and those on gases is regarded as ample justification for considering dissolved substances to be in a *pseudo*-gaseous condition.

Whatever the ultimate explanation of the facts may be, there can be no doubt that the existing speculations on the nature of osmotic pressure and allied phenomena have infused new life into the study of solutions. Indeed, as instigators to fresh inquiry these hypotheses must take rank as the most fruitful of recent times.

J. W. RODGER.

A SANITARIAN'S TRAVELS.

MR. ROBERT BOYLE has travelled round the world no fewer than four times for the purpose of studying sanitary science and preparing the way for the introduction of the ventilating and sanitary appliances he has invented. An interesting account of his fourth journey is given in a little book entitled "A Sanitary Crusade through the East and Australasia," consisting of a series of papers reprinted from the *Building News*. In the course of this "crusade" Mr. Boyle visited Burmah, the Malay native states, Sumatra, Siam, Borneo, Java, Australia, New Zealand, Samoa, the Sandwich Islands, and America. Of all the facts noted by him as a sanitarian the most remarkable are those relating to leprosy, a disease which he believes to be spreading to an alarming extent all over the world. He was particularly struck by the gigantic proportions the evil has assumed in Burmah. The steps of the great Shwedagon pagoda at Rangoon, the Mecca of the Indo-Chinese Buddhists, he found to be



GREAT RECUMBENT FIGURE OF BUDDHA, PEGU, BURMAH.

© 1892 Nature Publishing Group

"closely lined from top to bottom with lepers, suffering from that loathsome disease in its worst forms and most advanced stages." A number of the victims examined by Mr. Boyle "presented a most sickening and awful spectacle." Yet no provision worthy of the name appears to be made for the maintenance or treatment of these poor lepers, who are thus compelled to resort to begging to keep themselves in existence. At Mandalay Mr. Boyle came in contact with horrors of a similar nature. During times of high festival the entrances of the great Arakan pagoda in that city are crowded by hundreds of lepers, so that the visitor has to pick his way carefully among them. In the Sandwich Islands also Mr. Boyle was strongly impressed by the terrible effects of the curse of leprosy, which, he says, has nearly decimated the native population.

He has a curious theory to the effect that the propagation of leprosy has been to a large extent connected with cannibalism, the disease "being spread wholesale through the eating of infected bodies." He has frequently seen in New Caledonia and the South Sea Islands human bodies "hanging up in the natives' huts, intended for future repasts, though then in an advanced stage of decomposition and exhaling a sickening odour."

The little book is by no means occupied only with these terrible subjects. Reference is made to many interesting things which came under Mr. Boyle's observation in the course of his journey. We may especially note the impression produced upon him by Buddhist temples and various classes of objects associated with Buddhism in Burmah. Pagan, an ancient capital of Burmah, situated on the Irrawaddy between Mandalay and Rangoon, contains an enormous number of Buddhist temples of various sizes and styles of architecture, and the city, as seen from the river, is described by Mr. Boyle as "one of the grandest and most impressive sights he has ever seen." Lower down the Irrawaddy below Prome there is a cliff about two miles long and 300 feet high, on the face of which are carved innumerable figures of Buddha ranged in tiers from the bottom to the top. He thinks that some of these figures cannot be less than twenty feet high. Many of them are richly gilded, and the whole forms "a very brilliant and curious sight." We reproduce an illustration showing the great recumbent figure of Buddha, in the province of Pegu, of which Mr. Boyle reports that "it is said to measure about 270 feet in length by 70 feet at the shoulder." In a paper read lately before the Anthropological Institute (see NATURE, November 10, p. 46) Major R. C. Temple gives the length as 181 feet and the height at the shoulder as 46 feet. This remarkable monument is built of brick, and Major Temple speaks of it as "well proportioned throughout." It is supposed to have been produced in the fifteenth century. It was hidden from view by jungle until 1881, when it was accidentally discovered by a railway contractor.

GAUSS AND WEBER.

IN bringing before our readers the contents of a circular we have received with respect to the erection of a monument, in Göttingen, to the two world-renowned scientific workers and friends, Charles Frederick Gauss and William Weber, we do so, knowing that every scientific man, whether he be astronomer, mathematician, or physicist, will be only too glad to have a chance of paying some tribute, however slight, to their memory.

Only about a year has gone by since the younger of the two, William Weber, passed away, having brought glory to the University of Göttingen, which was radiated throughout the whole scientific world. The work which both have done in the service of science cannot be said to be the property of their followers alone, but is a precious heirloom of mankind, which has proved, and will continue to prove in the future, valuable in many ways in the service of technics, in methods of communication, and in civilization generally.

Gauss, who is almost unequalled among the scholars of the century, has not only left imposing landmarks of his great mind in all domains of pure mathematics, but he has also by his work furthered all departments of its applications in astronomy and physics, while his investigations have become standard for the theoretical as well as for the observational side.

What Gauss did for magnetism, Weber, whom Gauss had chosen for his fellow-worker, attracted by his useful work on acoustics, did for the strength of galvanic currents, for their impelling electromotive forces, and for their resistances.

Further, in teaching how to measure these quantities in absolute units, he has furnished extremely important methods for their investigation. In this way not only has the science itself been furthered, but a firm basis for the development of electro-technics has been formed, the soundness of which is proved by its general adoption and which has contributed greatly to the tremendous advance witnessed during the last ten years. The pamphlet then goes on to say: "It is not the purpose of these lines to enlarge on the eminent works which we owe to the co-operation of these great investigators; we can only call to mind the fertile researches on the laws of the earth's magnetism, from which as it were a new branch of physics has developed; further, the attempts to encompass the phenomena of electrostatics, electrodynamics, and induction by one single law, attempts which, however a future generation may judge of them, will mark an important epoch in scientific development; and further, we may recall the most popular result of their co-operation, viz. the erection of the first telegraph practically adopted for communication at a distance."

Since the year 1877 the birthplace of Gauss has possessed a memorial of him, but Göttingen, the place where he and Weber worked, and where the former died, and which consequently became celebrated, possesses no such memorial. That this should be remedied is the object of this circular, and one has only to glance down the list of names attached to it—about 275 altogether—to see that it includes most of the learned men in Germany, and those of many distinguished foreigners. Among these we are glad to see the name of Lord Kelvin, President of the Royal Society.

The acting committee is composed of Prof. Klein, E. v. Meier (Curator of the University), F. Merkel (Prorector of the University), G. Merkel (Over-burgomaster), Profs. E. Riecke, E. Schering, W. Schur, W. Voigt, H. Weber, and S. Benfey (banker), and it is to the last mentioned that subscriptions should be addressed (S. Benfey, Bankgeschäft, Göttingen). The list will remain open until April 1, 1893.

THE ANNIVERSARY OF THE ROYAL SOCIETY.

YESTERDAY being St. Andrew's Day the anniversary meeting of the Royal Society was held in their apartments at Burlington House. The auditors of the Treasurer's accounts having read their report, and the Secretary having read the list of Fellows elected and deceased since the last anniversary, the President (Lord Kelvin) proceeded to deliver the anniversary address. The medals were then presented as follows:—The Copley Medal to Prof. Rudolf Virchow, For.Mem.R.S. (received by the Foreign Secretary), for his investigations in Pathology, Pathological Anatomy, and Prehis-

© 1892 Nature Publishing Group